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and since  $x^2$  is a square it only remains to make  $2x$  a square, which it is when  $x=2$ . But this value of  $x$  makes the numbers the same.

Our next value of  $x$  is 8 and  $x^2=64$ , and  $2x=16$ , which numbers answer the conditions. The next value of  $x$  is 18 and the numbers are 324 and 36, and so on *ad infinitum*.

Also solved by W. H. DRAUGHON, ARTEMAS MARTIN, F. P. MATZ, J. F. W. SCHEFFER, G. B. M. ZERR, and J. K. ELLWOOD.

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## PROBLEMS.

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13. Proposed by ARTEMAS MARTIN, LL. D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

It is required to find four numbers the sum of whose fourth powers is a square number.

14. Proposed by SYLVESTER ROBINS, North Branch Depot, New Jersey.

Find initial terms in each of three infinite series of prime, integral, rational, scalene triangles, where 9 shall be the base, and the other two sides of every term shall have a constant difference.

15. Problems, or Propositions by M. A. GRUBER, M. A., War Department, Washington, D. C.

(a) The *difference* of two *odd* squares is always divisible by 8. Corollary: Every odd square is of the form  $8a+1$ .

(b) The *sum* of two *odd* squares is two times an *odd* number.

Solutions to these problems should be received on or before November 1st.

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## AVERAGE AND PROBABILITY.

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Conducted by B. F. FINKEL, Kidder, Mo. All Contributions to this department should be sent to him.

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## SOLUTIONS TO PROBLEMS.

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6. Proposed by J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

Find the average length of all the diameters that can be drawn in a given ellipse.

- II. Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland, and the PROPOSER.

By using the *complement* of the eccentric angle we deduce  $OD=a \sin \phi$